

04 17. (New) A diffractive optical element according to Claim 13, wherein the alignment mark is defined by a protrusion formed on the diffractive surface.--

REMARKS

The claims now pending in the application are Claims 4 to 17, the only independent claims being Claims 12 and 13. Claims 1 to 3 have been canceled. Claims 4 to 10 have been amended. Claims 13 to 17 are newly presented herein.

In the Official Action, Claim 12 was rejected under 35 U.S.C. §§ 101 and 112, second paragraph; Claims 1 to 11 were rejected under the judicially created doctrine of obviousness-type double patenting, as unpatentable over Claims 1 to 11 of commonly-owned U.S. Patent No. 6,120,950. Reconsideration and withdrawal of the rejections respectfully are requested in view of the above-amendments and the following remarks.

The formal rejections of Claim 12 respectfully are traversed. Nevertheless, without conceding the propriety of the rejections, independent Claim 12 has been rewritten to obviate the Examiner's objections. Favorable consideration and withdrawal of the formal rejections respectfully are requested.

The rejection of the claims under the judicially created doctrine of obviousness-type double patenting respectfully is traversed. Nevertheless, without conceding the propriety of the rejection, Claims 1 to 3 have been cancelled, Claims 4 to 10 have been amended, and Claims 13 to 17 have been newly presented more clearly to recite various novel features of the present invention, to obviate the outstanding rejections, and to provide Applicant with an additional scope of protection commensurate with the

disclosure. Support for the proposed amendments may be found in the original application.

No new matter has been added.

The present invention relates to a novel diffractive element and device manufacturing method. In one aspect, as now recited in independent Claim 12, the device manufacturing method comprises the step of exposing a substrate with a device pattern, projected from an exposure apparatus having a diffractive optical element, the diffractive optical element including (i) a diffractive surface for diffracting light of a predetermined first wavelength, and (ii) an alignment mark positioned within the diffractive surface and being arranged to produce a phase difference corresponding to a multiple, by an integral number, of the wavelength of light transmitted or reflected by the alignment mark, and the step of developing the exposed substrate.

In another aspect, as recited in newly presented independent Claim 13, the present invention relates to a diffractive optical element comprising a diffractive surface for diffracting light of a predetermined first wavelength, and an alignment mark positioned within the diffractive surface and being arranged to produce a phase difference corresponding to a multiple, by an integral number, of the wavelength of light transmitted or reflected by the alignment mark.

Applicant submits that the prior art fails to anticipate the present invention. Moreover, Applicant submits that there are difference between the subject matter sought to be patented and the prior art, such that the subject matter taken as a whole would not have been obvious to one of ordinary skill in the art at the time the invention was made.

The Unno '950 patent relates to an optical element manufacturing method, and discloses a manufacturing method including a first process of forming a mask pattern on a substrate, and a second process for forming a step-like structure on the substrate by using the mask pattern. However, Applicant submits that the claims of the '950 patent fail to anticipate or suggest at least the feature of specifying an alignment mark position within the diffractive surface and being arranged to produce a phase difference corresponding to a multiple, by an integer number, of a wavelength of light transmitted or reflected by the alignment mark, as disclosed and claimed in the present application. In this regard, Applicant notes that, in the Unno '950 patent apparatus and method, a two-level structure (see, Figures 2A and 5, process D) constitutes the structure of a diffractive surface itself. Nowhere does this illustration or description disclose structure corresponding to the claimed alignment mark.

For the above reasons, Applicant submits that independent Claims 12 and 13 are allowable over the cited art.

Claims 4 to 11 and 13 to 17 depend from Claim 13, and are believed allowable for the same reasons. Moreover, each of these dependent claims recites additional features in combination with the features of independent Claim 13, and is believed allowable in its own right. Individual consideration of the dependent claims respectfully is requested.

Applicant believes that the present Amendment is responsive to each of the points raised by the Examiner in the Official Action, and submits that the application is in

allowable form. Favorable consideration of the claims and passage to issue of the subject application at the Examiner's earliest convenience earnestly are solicited.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Charles E. Scinto", is written over a horizontal line.

Attorney for Applicant

Registration No. 32,078

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200

CPW/tmm



Application No. 09/434,300
Attorney Docket No. 00684.002932

VERSION WITH MARKS TO SHOW CHANGES MADE TO CLAIMS

1. (Canceled)
2. (Canceled)
3. (Canceled)
4. (Amended) A diffractive optical element according to Claim [1] 14,
wherein the diffractive surface and the alignment mark are adapted to transmit light rays of
the first and second wavelengths [λ and λ'].
5. (Amended) A diffractive optical element according to Claim [1] 14,
wherein the diffractive surface and the alignment mark are adapted to reflect light rays of
the first and second wavelengths [λ and λ'].
6. (Amended) A diffractive optical element according to Claim [1] 13,
wherein the diffractive surface comprises [a] binary optics, and wherein the diffractive
surface and the alignment mark are formed in accordance with a lithographic process.

7. (Amended) A diffractive optical element according to Claim [1] 13, further comprising a substrate on which the diffractive surface and the alignment mark are formed, and a metal ring for holding the substrate.

8. (Amended) A diffractive optical element according to Claim [1] 14, further comprising a metal ring, wherein the alignment mark is placed at a center of the diffractive surface, and wherein the alignment mark is disposed at a central position of an outside circumference of the metal ring.

9. (Amended) A diffractive optical element according to Claim 8, wherein the alignment mark and the central position of the metal ring are [registered] aligned with each other, on the basis of detection of the alignment mark by use of the [second] light of the second wavelength [λ'].

10. (Amended) A projection optical system including a diffractive optical element as recited in [any one of Claims 1 - 9] Claim 13.

12. (Amended) A device manufacturing method, comprising the steps of:
exposing a substrate with a device pattern, projected from an exposure apparatus having a diffractive optical element, the diffractive optical element including (i) a diffractive surface for diffracting light of a predetermined first wavelength, and (ii) an alignment mark positioned within the diffractive surface and being arranged to produce a

phase difference corresponding to a multiple, by an integral number, of the wavelength of
light transmitted or reflected by the alignment mark [by use of an exposure apparatus as
recited in Claim 11]; and
developing the exposed substrate.

CPW\gmc

DC_MAIN 125442 v 1